



Servo drives

■ Introduction

HCF servo drive - DC 24 / 48 V



The HCF servo drive is specially designed for direct supply with a 24 / 48 V mains voltage. This enables an extremely compact and cost-optimised design which is limited to the essential elements of the drive unit.

HCD servo drive - AC 230 V



The servo drive HCD is specially designed for supply with single-phase mains supply. It can be controlled either via digital and analog inputs, PLC Motion or via the CANopen fieldbus.

HCB servo drive



The compact single-axis servo drives of the HCB series are true all-rounders in drive technology. They combine maximum power density with extensive motion control functions.

HCJ servo drive - Allrounder



The modular single-axis servo drives of the HCJ series combine high performance volume and extensive motion control functions in four compact sizes. The high variance of the fieldbus connection and the encoder interfaces enables fast integration into existing industrial systems as well as a solid and future-proof basis for new systems and projects.

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HCD servo drive

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HCB servo drive

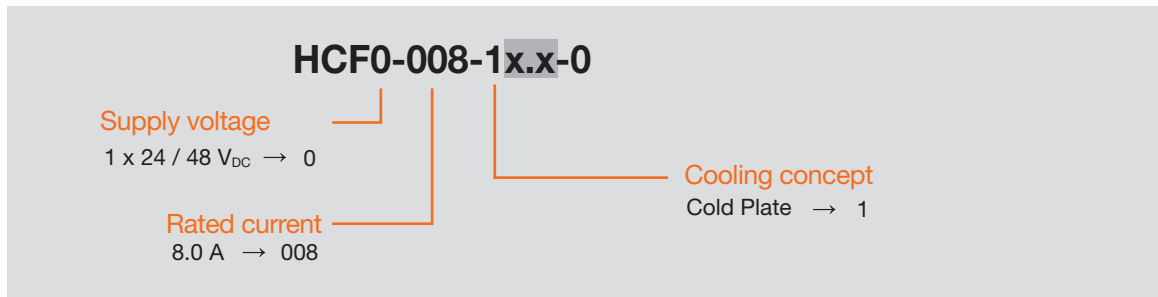
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HCJ servo drive

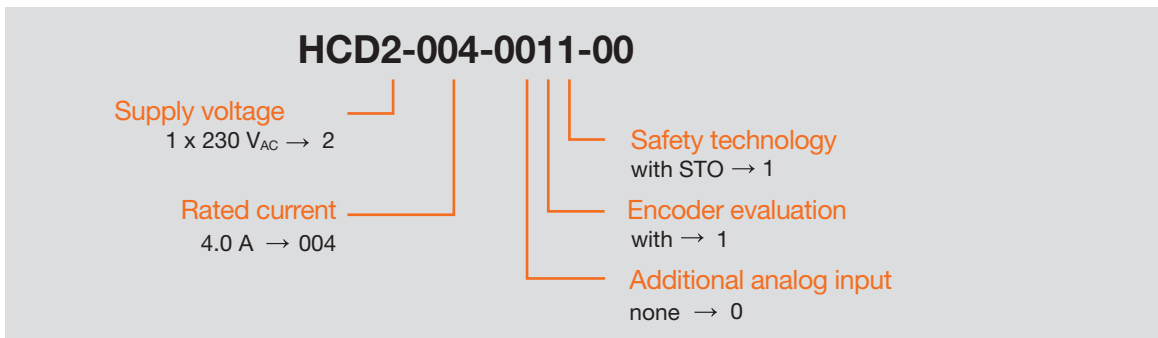
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Order code

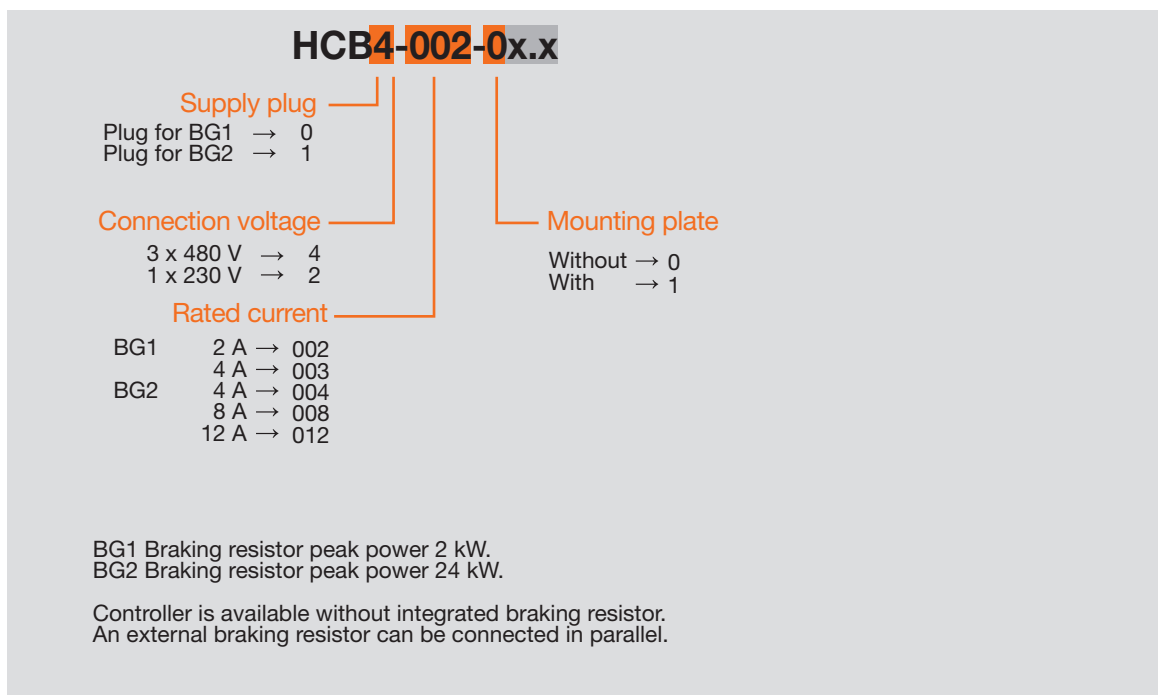
HCF servo drive



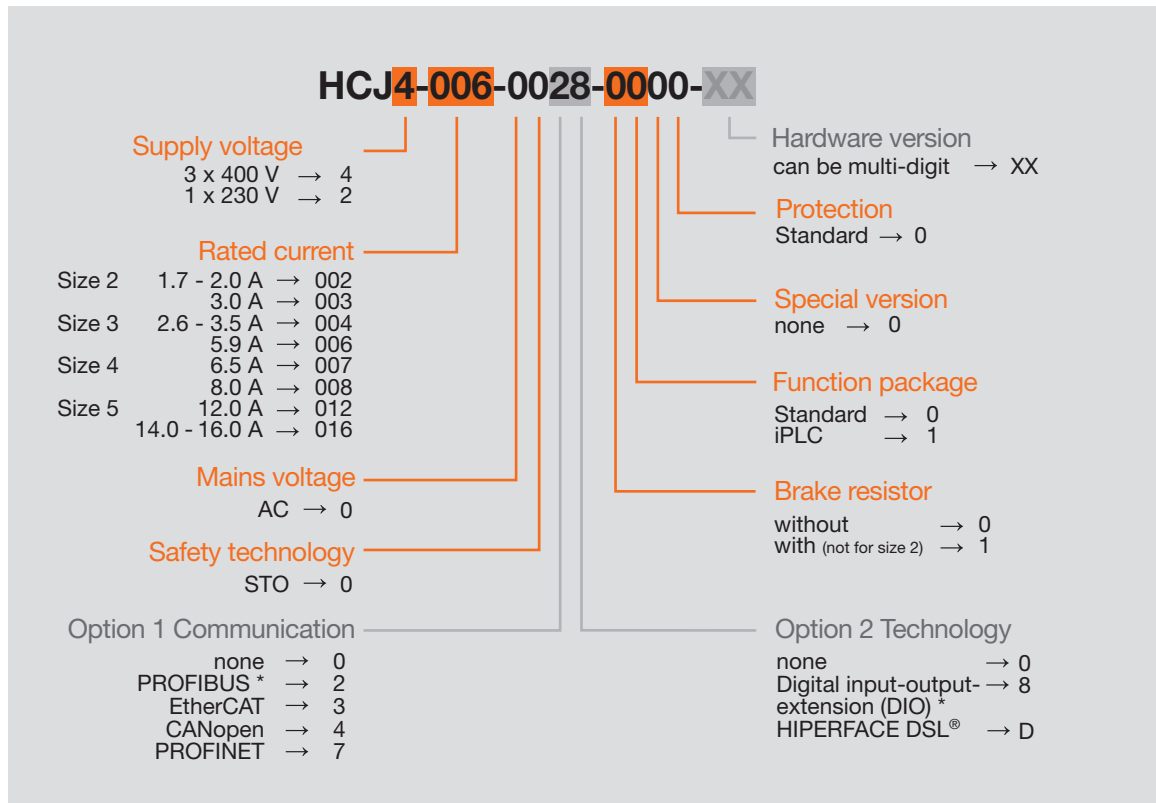
HCD servo drive



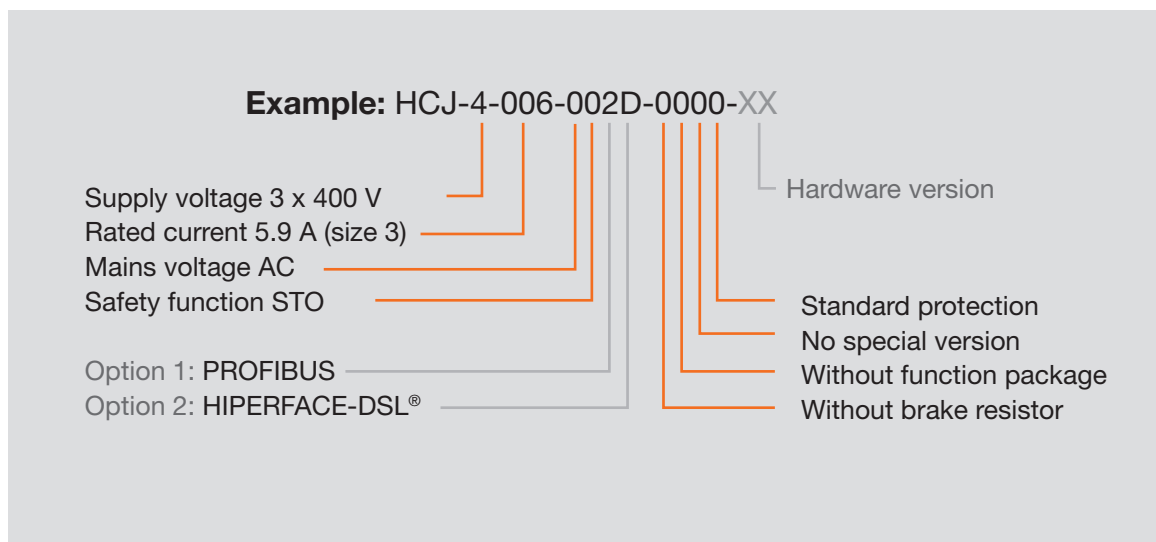
HCB servo drive



■ HCJ servo drive



* On request



HCF servo drive

24 to 48 V_{DC}



Specifications servo drive

Typ	Supply voltage [V _{DC}]	DC bus voltage [V _{DC}]	Output voltage [V _{rms}]	Continuous output current [A _{rms}]	Maximum output current ¹⁾ [A _{rms}]	Rated power [W]	Order code
HCF	24 - 48	24 - 48	3x0 - 33	8	16	240	HCF0-008-1x.x.-0

1) 2x rated current for 30 sec

Switch frequency [kHz]: 8, 16 (Factory setting 8 kHz)

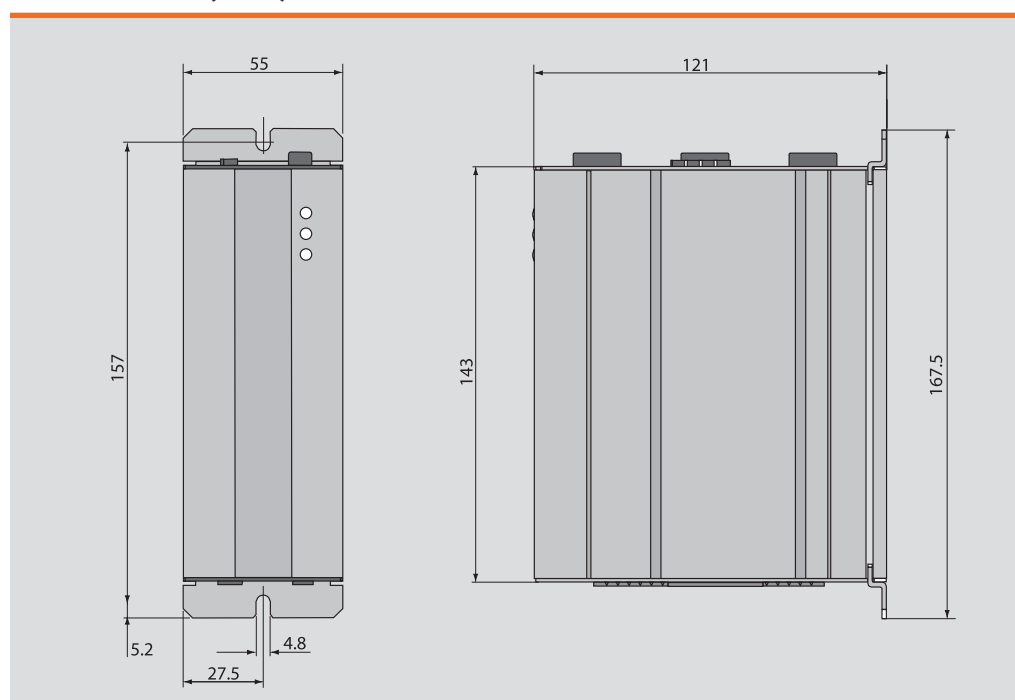
Power rating [kVA]: 0.55

Cable cross-section [mm²]: 1.5...2.5

Logic supply [V_{DC}]: 24

The HCF servo drive is a cost-optimized, DC powered 24 V or 48 V motor controller for use in the demanding world of precision automation technology. The HCF features high precision positioning functionality, a sturdy mechanical design, CANopen CiA 402 support, safe stop according to Category 3 of IEC 954-1, and much more.

Dimensions (mm)



Connections / inputs and outputs

Type	Connection	Function
X1	Plug-in terminal (6-pole)	DC supply (L+ / L-) Brake resistor (L+ / RB)
X2	Plug-in terminal (2 x 10-pole)	Safe Stop with relay output 8 digital inputs 2 analog inputs 10-bit ADC 3 digital outputs 1 relay output (24 V / 1 A) Logic supply
X3	Plug-in terminal (4-pole)	Motor phases (U/V/W/PE)
X4	D-sub connector (9-pole)	RS232 interface
X5	D-sub panel connector (9-pole)	CANopen interface
X6	D-sub connector (15-pole)	Interface for rotary encoders with temperature monitoring (PTC / KTY / Klixon)
S1	Rotary code switch	Setting the CANopen address

Ambient conditions

Ambient temperature in operation:	- 10 °C ... + 40 °C
Storage temperature:	- 25 °C ... + 55 °C
Operating and storage humidity:	15 ... 85 % relative humidity (without condensation)
Protection class:	IP20
Installation altitude:	up to 1,000 m

Supported encoder systems

Resolver, Incremental encoder, SSI absolute encoder

Interface

CANopen (CiA 402), RS232

Functions

- Brake driver
- PLC Motion
- DriveManager software
- Online position profile generator
- Integrated braking resistor
- Electronic cam
- Sequenced driving set positioning
- Safe stop according to EN 954-1, category 3

HCD servo drive, 230 V_{AC}



Specifications servo drive

Type	Supply voltage	DC bus voltage	Output Voltage	Continuous output current	Maximum output current	Rated power	Order Code
	[V _{AC}]	[V]	[V _{rms}]	[A _{rms}]	[A _{rms}]	[W]	
HCD	1 x 230	320	3 x 0 - 230	4	8	800	HCD2-004-0011-00

Switch frequency [kHz]: 4, 8, 12, 16 (Factory setting 8 kHz)

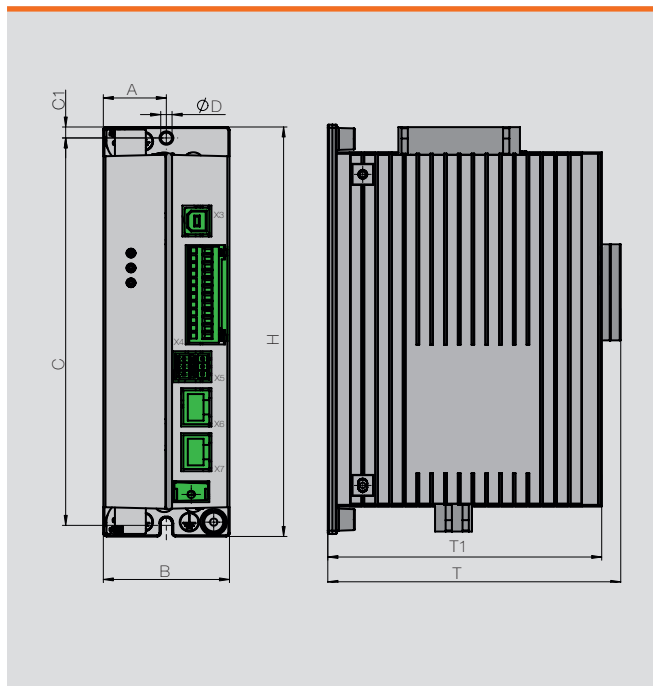
Power rating [kVA]: 1.84

Cable cross-section [mm²]: 0.2...1.5

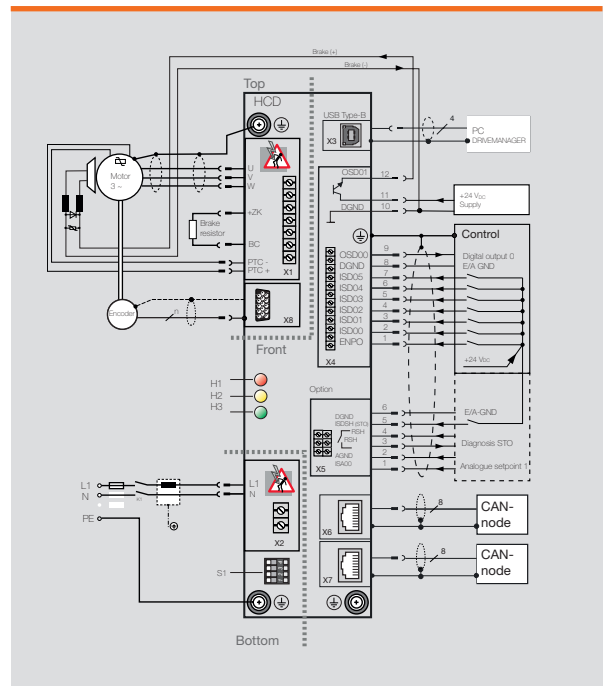
Mains frequency [Hz]: 50 / 60 ± 10 %

The small 4-Q-servo-drive HCD has been specially developed for cost-sensitive and simple control tasks, such as speed-, torque-, and position-controlled applications. Its drive control uses digital- and analogue inputs, PLC Motion or fieldbus (CANopen). Depending on the motor, the HCD has an output power up to 800 W in S1 mode. Our specially developed HES/HEM encoder system is suitable for this purpose.

Dimensions



Connection plan



Connections

Type	Connection	Function
H1, H2, H3	Light emitting diodes (integrated)	Device status display
S1	DIP circuit	Setting the CAN address
X2	Plug-in terminal (2-pole)	Single phase supply
PE	PE connection pins	Protective grounding
X4	Plug-in terminal (12-pole)	6 digital inputs 1 digital output Interface for motor brake
X1	Plug-in terminal (7-pole)	Motor phases (U/V/W) Brake resistor (+ZK, BC) Temperature monitoring (PTC+, PTC-)
X3	USB connector (Type-B)	Connection for PC with DriveManager
X6/ X7	2x RJ45 connector	CANopen interface
X8	D-Sub connector (15-pole)	Interface for rotary encoder
X5 (opt.)	Plug-in terminal (6-pole)	Connections for STO functionality (ISDSH, RSH)
X5 (opt.)	Plug-in terminal (6-pole)	Analogue input (ISA00), resolution 10-bit ADC

Ambient conditions

Humidity in operation:	relative humidity 5 - 85 % without condensation
Ambient temperature in operation:	+ 5 °C ... - + 40 °C
Storage humidity:	relative humidity 5 - 95 %
Storage temperature:	- 25 °C ... + 55 °C
Protection class:	IPO0
Installation altitude:	up to 1,000 m, up to 2,000 meter with power reduction

Supported encoder systems

SSI, TTL

Interface

CANopen (CiA 402)

Functions

- PLC Motion
- Speed control
- Torque control
- Positioning
- Ramp generator
- Integrated mains filter
- Integrated braking resistor
- UL approval*: Certified according to UL 508c
- Safety function STO

* Valid as long as the prescribed operating conditions are observed.

■ HCB servo drive

Introduction

■ General information

The compact single-axis servo drives of the HCB-series are true all-rounders in drive technology. They combine maximum power density with extensive motion control functions. The HCB-series consists of two sizes, which are divided into two power stages for the 1-phase units and three power stages for the 3-phase units. All proven fieldbus interfaces are “on board” - from CANopen to EtherCAT to PROFINET, which promise problem-free communication. Its versatility is further underlined by the numerous encoder interfaces, also for single-cable solutions. Complex positioning tasks through linked position sets can be interconnected. The position-synchronous or speed- synchronous motion of various drives with variable gear ratios can be quickly parameterised via the software assistant. Rotary table applications, position triggers, rotor position triggers or switching cams - a wide range of dynamic application tasks can be handled via the integrated software functions.

In combination with the HeiMotion servo motors with encoder variant matched to your application and a gearbox from the HMPG series mounted in the gearbox direct attachment, you get a customized drive axis from a single source at an unbeatable price-performance ratio.

■ General functions

Functions*

- Safety function "Safe Torque Off" (STO)
- Realization of functionality SS1 possible
- Switching cams
- Direct control of the holding brake in the motor
- Automatic determination of motor parameters
- Position set-dependent synchronization possible
- Path program / linking
- Integrated position control
- Parameterizable belt locks

* Some functions are not available for all models



Specifications servo drive

	single-phase		three-phase		
	HCB 2/6-1	HCB 4/12-1	HCB 4/12-3	HCB 8/24-3	HCB 12/30-3
Voltage supply	230 V _{AC} [± 10 %], 50...60 Hz		3 x 230...480 V _{AC} [± 10 %], 45...66 Hz		
Control voltage	24 V _{DC} [± 20 %] (0,35 A)		24 V _{DC} [± 20 %] (0.35 A)	24 V _{DC} [± 20 %] (0.45 A)	24 V _{DC} [± 20 %] (0.65 A)
DC link voltage	325 V _{DC} (with U _{mains} = 230 V _{AC})		565 V _{DC} (with U _{mains} = 400 V _{AC})		
Output power	400 W	800 W	1.6 kW	3.2 kW	4.8 kW
Max. output power for 2 s	1 kW	2 kW	4.8 kW	9.6 kW	12 kW
Rated output current 2 Arms 4 Arms	2 A _{rms}	4 A _{rms}	4 A _{rms}	8 A _{rms}	12 A _{rms}
Max. output current for 2 s Arms	6 A _{rms}	12 A _{rms}	12 A _{rms}	24 A _{rms}	30 A _{rms}
Internal brake resistor	75 Ω		30 Ω		
Continuous power / pulse power	until 2 kW		until 24 kW		
External brake resistor	75 Ω, max. 2 kW		≥ 30 Ω		
Holding brake	24 V _{DC} , max. 2 A		24 VDC, max. 2A		
Dimensions servo drive H x W x D	200 x 50 x 163 mm 245 x 50 x 163 mm with mounting plate		230 x 67 x 200 mm 275 x 67 x 200 mm with mounting plate		
Weight	1.5 kg		2.9 kg		
Encoder evaluation	EnDat 2.2, HIPERFACE®, HIPERFACE DSL®, resolver, analogue and digital incremental encoders with/without commutation signals, BISS (Type C)		EnDat 2.2, HIPERFACE®, HIPERFACE DSL®, resolver, analogue and digital incremental encoders with/without commutation signals, BISS (Type C)		
Interfaces	USB 2.0, Ethernet, CAN-Bus, EtherCAT, PROFINET, MicroSD-Card		USB 2.0, Ethernet, CAN-Bus, EtherCAT, PROFINET, MicroSD-Card		
Inputs / outputs	8 x digital in (24 VDC), 2 x analogue in (± 10 V) 3 x digital out (24 VDC)		8 x digital in (24 VDC), 2 x analogue in (± 10 V) 3 x digital out (24 VDC)		
Product numbers	12-225-020-01-0	12-225-020-02-0	12-405-020-11-0	12-405-020-12-0	12-405-020-13-0

■ HCB servo drive

Hardware equipment

In-/outputs

2 analog inputs (± 10 V DC, 12 bit)

8 digital inputs / 3 outputs - standard

Motor temperature sensor: PTC, NTC, KTY84-130, o.s.

Encoder systems (singleturn and multiturn)

EnDAT 2.2

HIPERFACE

HIPERFACE DSL

Resolver

Analog and digital incremental encoders

SSI/BiSS C

Field-bus systems

CANopen

EtherCAT

PROFINET

■ Software functions (Heidrive ServoCommander)

Commissioning

Automatic motor identification

Automatic encoder offset determination

Autotuning

Motor systems

Permanent-magnet synchronous machines with sinusoidal EMF

Torque motors

Air-core and iron-core linear motors with a low motor inductance (0.5...4 mH)

Control types

Torque / power control

Speed control

Position control

Motion profile

Point-to-point positioning

Synchronous movement / electronic gear

Round axis

Cam disks

Virtual master: CANopen, CiA DSP402

Standard-compliant movement profiles

Standardization in user units ($^{\circ}$, μm , ...)

■ Approvals

CE

Meets low-voltage directive 2014/35/EU and the product regulation EN 61800-5-1

UL/CSA

HCB 1-phase & HCB 3-phase: UL 61800-5-1, CSA C22.2, No. 274

EMV

- Interference immunity according to EN 61800-3 environment class 1 and 2
- HCB 1-phase: Public low-voltage network: "First and second environment (residential area C2 / industrial area C3)" up to 25 m motor cable length
- HCB 1-phase & HCB 3-phase: Industrial low-voltage network: "Second environment" (industrial area C3) up to 25 m motor cable length

STO (Integrated safety functions)

- EN 61800-5-2
- EN ISO 13849-1 "PL e"
- EN 61800-5-2 / IEC 61508 / EN 62061 "SIL 3" / "SIL CL 3"

The approval was conducted by the accredited certification agency "TÜV Rheinland"

■ HCB servo drive

Connections & ambient conditions

Connections / inputs and outputs

Connection	Function
X1	I/O communication
X2A	Resolver connection
X2B	Multi-encoder connection
X3	STO interface (STOA, STOB), limit switch (DIN6, DIN7) Dig. output (DOUT0)
X4	CANopen
X6	Motor connection
X6A	Motor brake / HIPERFACE DSL® (HCB 3-phase)
X9	Voltage supply
X9A	Brake resistor (HCB 3-phase)
X9B	24V supply (HCB 3-phase)
X18	Ethernet interface
X19	USB interfae
X21	Realtime Ethernet interface

Ambient conditions

Ambient temperature in operation:	0 °C to +40 °C +40 °C to +50 °C with power reduction 2.5 % / K
Storage temperature:	-25 °C to +70 °C
Operating and storage humidity:	relative humidity 90 % (without condensation)
Protection class:	IP20
Installation altitude:	Mounting height max. 2000 m above sea level, above 1000 m above sea level with power reduction 1 % per 100 m

Power Cable

Length	Heidrive-No.
3 m	14-007-051-18-0
5 m	14-007-051-19-0
10 m	14-007-051-23-0

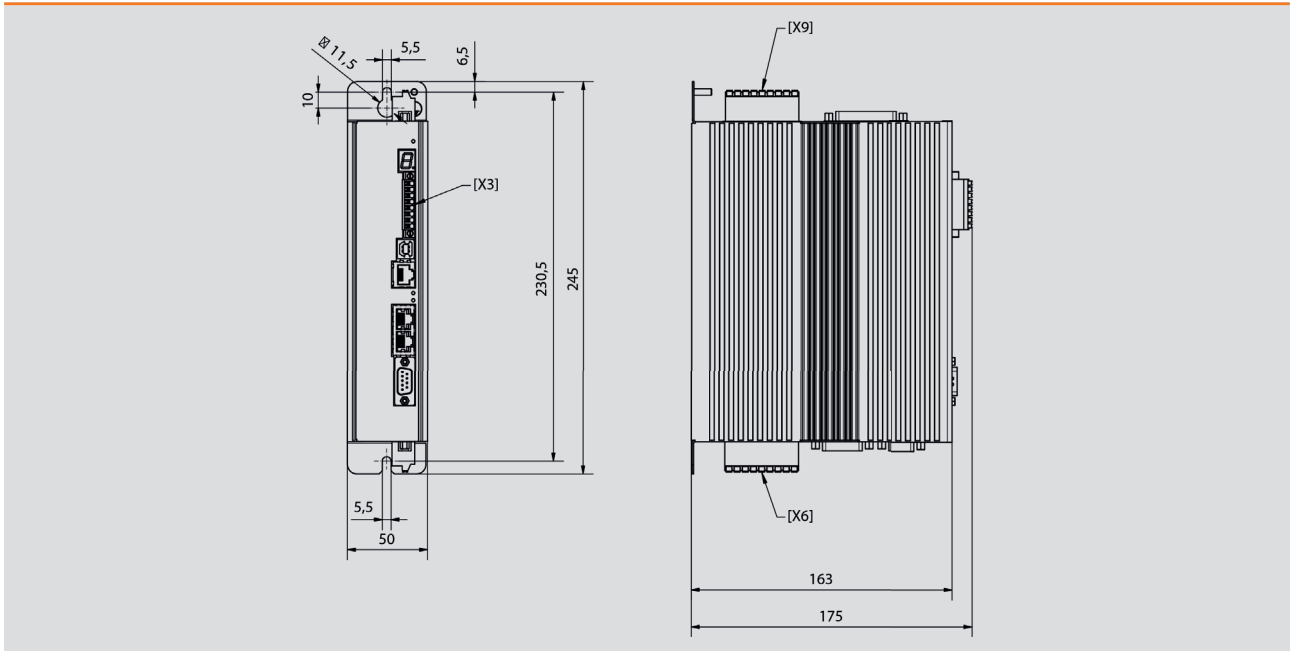
Signal cable (resolver)

Length	Heidrive-No.
3 m	14-007-051-60-0
5 m	14-007-051-62-0
10 m	14-007-051-67-0

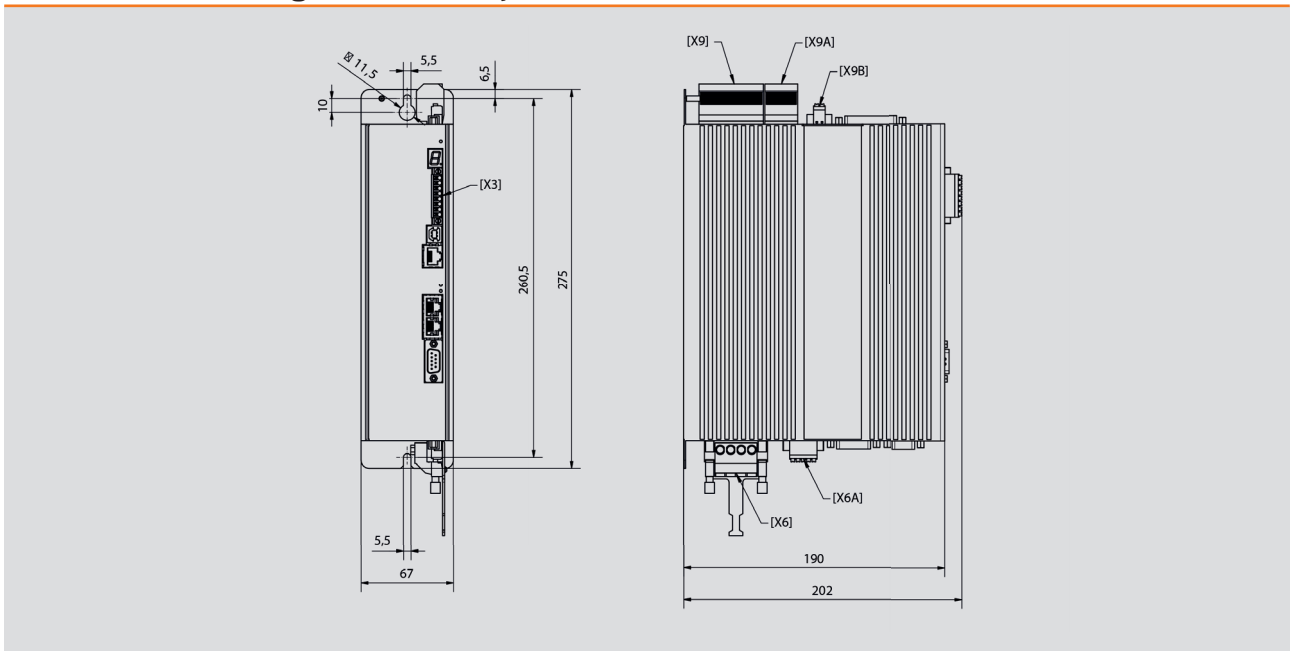
Signal cable (HIPERFACE)

Length	Heidrive-No.
3 m	14-007-051-78-0
5 m	14-007-051-80-0
10 m	14-007-051-85-0

Dimensional Drawing HCB / single-phase



Dimensional Drawing HCB / three-phase



■ HCB servo drive

Connectors single-phase

Connector STO [X3]

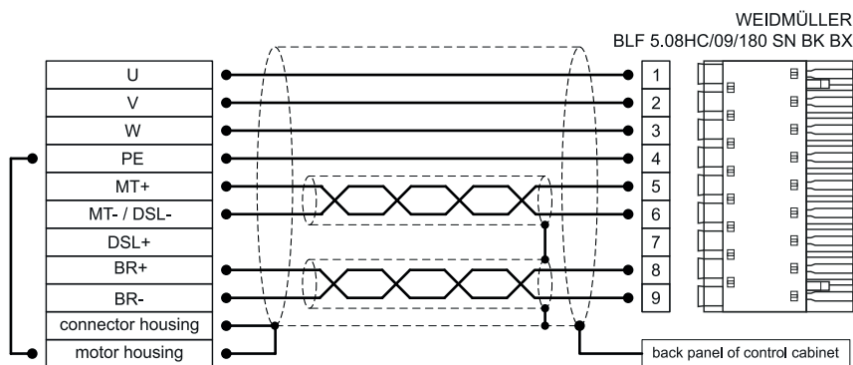
14-001-015-22-0

Order code connectors single-phase



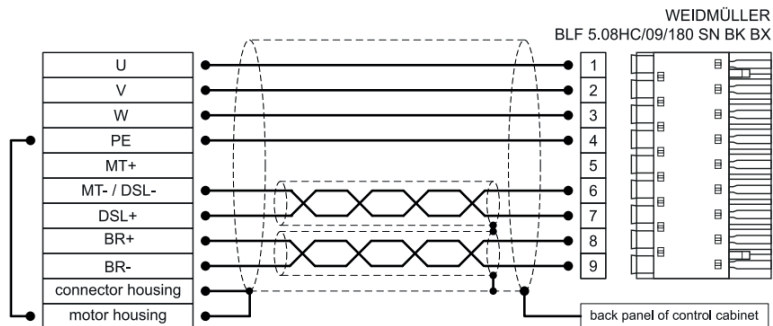
Pin	Name	Description
1	STOA	Control input A for the STO function
2	GNDA	Reference potential for STO-A
3	STOB	Control input B for the STO function
4	GNDB	Reference potential for STO-B
5	DIN6	Connected to X1, pin 22
6	DIN7	Connected to X1, pin 10
7	DOU0	Connected to X1, pin 12
8	GND	Reference potential for the auxiliary supply voltage

Pin assignment [X6] - motor with a motor temperature sensor



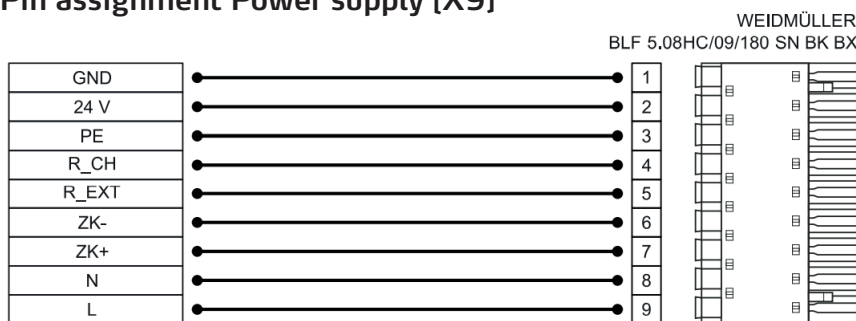
Pin	Name	Specification
1	U	Motor phase U
2	V	Motor phase V
3	W	Motor phase W
4	PE	Protective earth conductor of the motor
5	MT+	Motor temperature sensor +
6	MT-/DSL-	Motor temperature sensor -
7	DSL+	
8	BR+	Holding brake +
9	BR-	Holding brake -

Pin assignment [X6] - motor with HIPERFACE DSL



Pin	Name	Specification
1	U	Motor phase U
2	V	Motor phase V
3	W	Motor phase W
4	PE	Protective earth conductor of the motor
5	MT+	HIPERFACE DSL +
6	MT-/DSL-	HIPERFACE DSL -
7	DSL+	
8	BR+	Holding brake +
9	BR-	Holding brake -

Pin assignment Power supply [X9]



Pin	Name	Specification
1	GND	Supply voltage reference potential
2	24 V	Supply voltage for the control module and holding brake
3	PE	Connection of the protective earth (ground) conductor of the mains power supply
4	R_CH	Braking resistor connection
5	R_EXT	Braking resistor connection
6	ZK-	Neg. DC bus voltage
7	ZK+	Pos. DC bus voltage
8	N	Neutral conductor
9	L	Phase conductor/mains phase

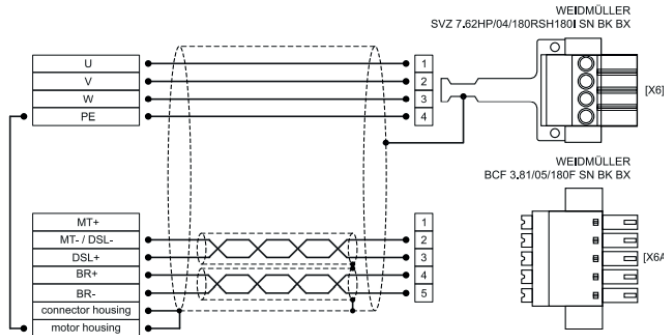
■ HCB servo drive

Connectors three-phase

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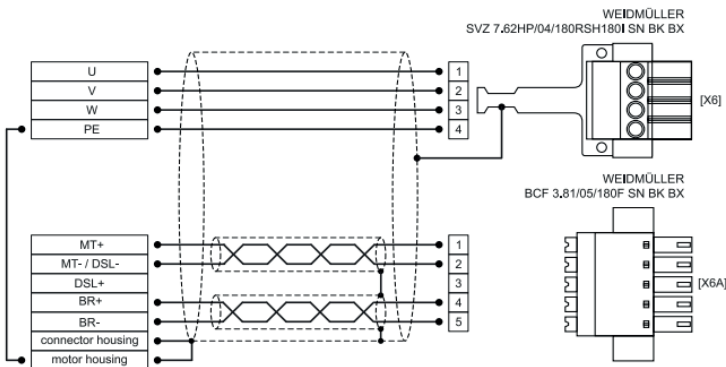
Order code connectors three-phase

Pin assignment [X6, X6A] - motor with HIPERFACE DSL



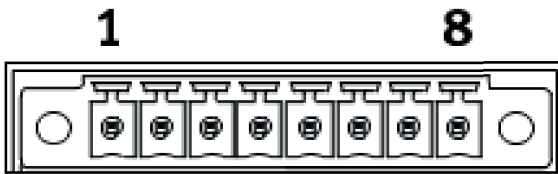
Pin X6	Name	Specification
1	U	Motor phase U
2	V	Motor phase V
3	W	Motor phase W
4	PE	Protective earth conductor of the motor
Pin X6A	Name	Specification
1	MT+	
2	MT-/DSL-	HIPERFACE DSL -
3	DSL+	HIPERFACE DSL +
4	BR+	Holding brake +
5	BR-	Holding brake +-

Pin assignment [X6, X6A] - motor with a motor temperature sensor



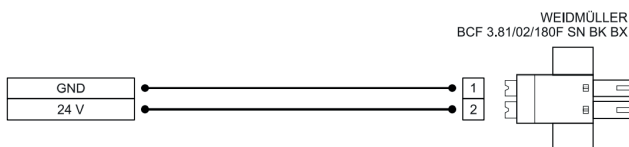
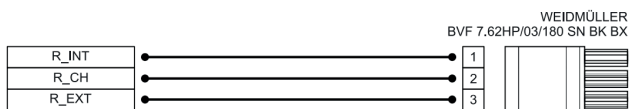
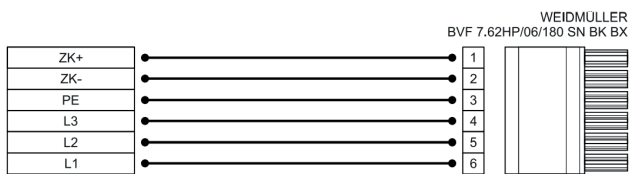
Pin X6	Name	Specification
1	U	Motor phase U
2	V	Motor phase V
3	W	Motor phase W
4	PE	Protective earth conductor of the motor
Pin X6A	Name	Specification
1	MT+	Motor temperature sensor +
2	MT-/DSL-	Motor temperature sensor -
3	DSL+	
4	BR+	Holding brake +
5	BR-	Holding brake +-

Connector STO [X3]



Pin	Name	Description
1	STOA	Control input A for the STO function
2	GNDA	Reference potential for STO-A
3	STOB	Control input B for the STO function
4	GNDB	Reference potential for STO-B
5	DIN6	Connected to X1, pin 22
6	DIN7	Connected to X1, pin 10
7	DOU0	Connected to X1, pin 12
8	GND	Reference potential for the auxiliary supply voltage

Connector power supply [X9], [X9A], [X9B]



Pin X9	Name	Specification
1	ZK+	Pos. DC bus voltage
2	ZK-	Neg. DC bus voltage
3	PE	Connection of the protective earth (ground) conductor of the mains power supply
4	L3	Phase conductor / mains phase 3
5	L2	Phase conductor / mains phase 2
6	L1	Phase conductor / mains phase 1

Pin X9A	Name	Specification
1	R_INT	Internal braking resistor connection
2	R_CH	Braking resistor connection
3	R_EXT	External braking resistor connection

Pin X9B	Name	Specification
1	GND	Supply voltage reference potential
2	24 V	Supply voltage for the control module and holding brake

■ HCJ servo drive

Introduction

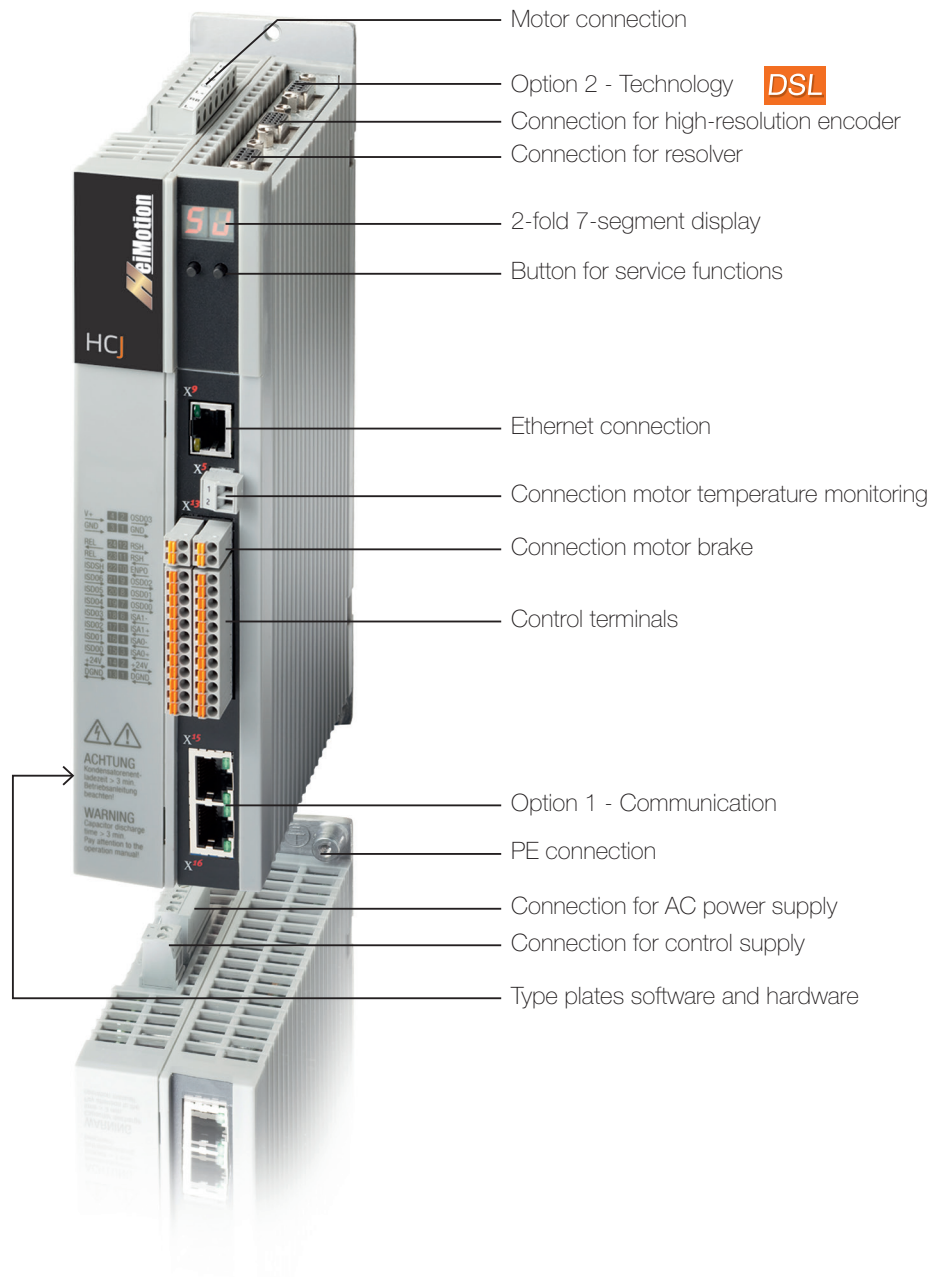
■ General information

The modular single-axis servo drive of the HCJ series combines a high performance volume and vast motion control functions in four compact sizes. The high variance in terms of fieldbus connection and the encoder interfaces enables fast integration into existing industrial systems as well as a solid and future-proof basis for new systems and projects. Entirely pluggable connections ensure a fast mounting and commissioning.

■ General information: Extensive motion control functions

- Interpolating positioning modes (linear, spline ...)
- Point-to-point positioning with integrated smooth profile calculation
- Axis- or controller-based referencing
- Synchronous motion for electronic gearing or cam discs
- Probe inputs (Touch-Probe)
- Application-specific units selectable

■ Technical features



HCJ servo drive

Overview



Type	HCJ - size 2	HCJ - size 3	HCJ - size 4	HCJ - size 5
Supply voltage	1 x 230 V _{AC}	1 x 230 V _{AC}	1 x 230 V _{AC}	-
	3 x 400 V _{AC}	3 x 400 V _{AC}	3 x 400 V _{AC}	3 x 400 V _{AC}
Rated output current at 230 V	3 A _{rms}	5.9 A _{rms}	8 A _{rms}	-
Rated output current at 400 V	2 A _{rms}	3.5 / 5.5 A _{rms}	6.5 / 8.5 A _{rms}	12 / 16 A _{rms}
Approval	CE, UR	CE, UL	CE, UL	CE, UL
Dimensions	55 x 235 x 142 mm	55 x 235 x 189 mm	55 x 315 x 235.5 mm	90 x 315 x 235.5 mm
Cooling	Air cooling			
Field buses (Option1)	EtherCAT, PROFINET IRT, CANopen, PROFIBUS DPV1			
Technology (Option2)	Digital input-output-extension (DIO), One cable interface			
Safety technology	STO in conformity with SIL 3 acc. to IEC 61508 / IEC 62061, PL e acc. to EN ISO 13849			
Internal safety control	with external Safe Monitoring Control (SMC)			
Current carrying capacity	p. 29	p. 29	p. 29	p. 29
Specifications	p. 32 / 33	p. 34 / 35	p. 36 / 37	p. 38 / 39

Current carrying capacity

HCJ for 1 x 230 V

Type	Power amplifier switching frequency [kHz]	Ambient temperature max. [°C]	Rated output current I_N [A _{rms}]	Maximum output current I_{max}			
				200 % (2 I_N)		300 % (3 I_N)	
				[A _{rms}]	duration [s]	[A _{rms}]	duration [s]
22.003 (size 2)	4	45	3.0	6.0	10	9.0	0.08
	8	40	3.0	6.0		9.0 ¹⁾	0.08 ¹⁾
	16	40	2.0	4.0		6.0 ¹⁾	0.08 ¹⁾
22.006 (size 3)	4	45	5.9	11.8	10	-	-
	8	40					
	16	40					
22.008 (size 4)	4	45	8.0	16.0	10	-	-
	8	40	8.0	16.0			
	16	40	5.4	10.8			

1) Automatic power stage switching frequency change to 4 KHz
Specifications apply to a motor cable length ≤10 m. Maximum permissible motor cable length 30 m.
All current values with recommended power choke.

HCJ for 3 x 400 V

Type	Power amplifier switching frequency [kHz]	Ambient temperature max. [°C]	Rated output current I_N [A _{rms}]	Maximum output current I_{max}			
				200 % (2 I_N)		300 % (3 I_N)	
				[A _{rms}]	duration [s]	[A _{rms}]	duration [s]
24.002 (size 2)	4	45	2.0	4.0	10 ²⁾	6.0	0.08 ²⁾
	8	40	2.0	4.0		6.0 ¹⁾	
	16	40	0.7	1.4		6.0 ¹⁾	
24.004 (size 3)	4	45	5.5	7.1	10 ²⁾	10.5	0.08 ²⁾
	8	40	3.5	7.0		10.5 ¹⁾	
	16	40	2.9	5.8		10.5 ¹⁾	
24.007 (size 4)	4	45	8.5	13.0	10 ²⁾	19.5	0.08 ²⁾
	8	40	6.5	13.0		19.5 ¹⁾	
	16	40	4.0	8.0		19.5 ¹⁾	
24.012 (size 5)	4	40	13.0	26	10 ²⁾	39.0	0.10 ²⁾
	8	40	12.0	24		39.0 ¹⁾	
	16	40	10.5	15.8		39.0 ¹⁾	
24.016 (size 5)	4	40	20.0	40.0	10 ²⁾	60.0	0.10 ²⁾
	8	40	16.0	32.0		60.0 ¹⁾	
	16	40	9.0	14.4		60.0 ¹⁾	

1) Automatic switching of switching frequency of power amplifier to 4 KHz
Specifications apply to a motor cable length ≤10 m. Maximum permissible motor cable length 30 m.
2) Switching-off in accordance with I²T-characteristic

HCJ servo drive

Hardware equipment

Performance data

Mains voltage	1 x 230 V _{AC} 3 x 400 V _{AC}
Rated current at 1 x 230 V _{AC}	3 - 8 A _{rms}
Rated current at 3 x 400 V _{AC}	2 - 16 A _{rms}
Overload factor	3.0
Rotating field frequency	400 Hz
Switching frequency of power storage	4 / 8 / 16 kHz
Integrated brake chopper electronics	■
Integrated brake resistor	□

Safety technology

STO - Safe Torque Off	■
Integrated safety control	-

Control hardware

Analog inputs (± 10 V DC, 12 bit)	■ 2
Digital inputs / outputs - Standard thereof touchprobe inputs (probes)	■ 8/3 ■ 2
Digital input output extension (4 inputs / 8 outputs)	□
Relais	■ 1
Motor temperature monitoring	■ PTC, KTY, Klixon

Encoder systems

Encoder channel 1	■ Resolver
Encoder channel 2	■ SinCos encoder with NP, SSI, EnDat 2.2 or HIPERFACE®
	■ SSI encoder
	■ digital EnDat 2.2 encoder
	■ TTL encoder

Field bus systems

CANopen	□
PROFIBUS-DPV1	□
EtherCAT	□
PROFINET IRT	□

Technology

second SinCos encoder	SinCos encoder with ZP, SSI, EnDat 2.2	□
	SSI encoder	□
	digital EnDat 2.2 encoder	□
	TTL encoder	□
One cable system with HIPERFACE DSL® encoder		□
TTL encoder simulation		□
SSI encoder simulation		-
TTL master		□
TTL encoder with commutation signals		□
Bidirectional axis cross communication (TwinSync, max. 2 axes)		-

EMV approvals

Integrated mains filter C2 (10 m) / C3 (25 m)	-
External mains filter C2 (10 m) / C3 (30 m)	□
External mains filter C2 (100 m) / C3 (150 m)	-
Approvals	CE, UL

Cooling concept

Air cooling	■
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■ = Standard version

□ = Optionally

- = Undeliverable

Software functions

Commissioning

Automatic motor identification	■
Automatic encoder offset determination	■
Autotuning	■

Motor systems

Rotative asynchronous motors	■
Rotative synchronous motors	■
Linear synchronous motors	■

Control types

Torque / power control	16 kHz
Speed control	8 kHz
Position control	8 kHz
Sensorless control of synchronous motors	on request

Control functions

Field-weakening for asynchronous motors	■
Field-weakening for synchronous motors	■
Auto commutation for synchronous motors	■
Acceleration pre-control	■
Predictive speed control	■
Freely configurable filter (PT1, PT4, bandstop etc.)	■
Active vibration damping	■

Correction procedure

GPOC procedure (encoder correction)	■
Friction moment compensation	■
Moment of inertia compensation	■
Axis / spindle error correction	■

Motion profile

Point-to-point positioning	■
Interpolating positioning	Linear, spline
Synchronous movement / electronic gear	■
Modulo / round axis	■
Cam disks	□
Axis-guided reference runs	■
Virtual master	■
Standard-compliant movement profiles	CANopen CiA 402 EtherCAT CoE PROFIdrive
Standardization in user units (°, μm, ...)	■

Technology

Programmable in IEC 61131	□
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HCJ servo drive

Ambient conditions

Ambient conditions

Protection class	IP20 except clamps (IP00)
Accident prevention regulation	In conformity with local regulations (in Germany e. g. DGUV regulation 3)
Mounting altitude	Up to 1,000 meters above sealevel, starting on from 1,000 meters above sealevel with power reduction (1 % per 100 m, max. 2,000 m above sealevel)
Pollution degree	2
Mounting method	Installation only for vertical mounting into a switch cabinet with protection class at least IP4x, if using the safety function STO at least IP54

Climate conditions

During transportation	According to EN 61800-2, IEC 60721-3-2 class 2K3 ¹⁾
	Temperature: - 25 °C to + 70 °C
	Relative humidity: 95 % at max. + 40 °C
During storage	According to EN 61800-2, IEC 60721-3-1 class 1K3 and 1K4 ²⁾
	Temperature: - 25 °C to + 55 °C
	Relative humidity: 5 to 95 %
During operation	According to EN 61800-2, IEC 60721-3-3 class 3K3 ³⁾
	Temperature: - 10 °C to + 45 °C (4 kHz), up to 55 °C with power reduction (2 % / °C) - 10 °C to + 40 °C (8, 16 kHz), up to 55 °C with power reduction (2 % / °C)
	Relative humidity: 5 to 85 % without condensation

1) Absolute humidity is limited to maximum 60 g/m³. That means that e.g. at 70 °C the relative humidity may only account for maximum 40 %.

2) Absolute humidity is limited to maximum 29 g/m³. The maximum values for temperature and relative humidity listed in the table must not occur simultaneously with the maximum humidity.

3) Absolute humidity is limited to maximum 25 g/m³. That means that the maximal values for temperature and relative humidity listed in the table must not occur simultaneously.

Mechanical conditions

Vibration limits during transportation	According to EN 61800-2, IEC 60721-3-2 class 2M1		
	Frequency [Hz]	Amplitude [mm]	Acceleration [m/s²]
	2 ≤ f < 9	3.5	not applicable
	9 ≤ f < 200	not applicable	10
	200 ≤ f < 500	not applicable	15
Shock limit during transportation	According to EN 61800-2, IEC 60721-2-2 class 2M1		
	Drop height of packed device max. 0.25 m		
Vibration limits of system	According to EN 61800-2, IEC 60721-3-3 class 3M1		
	Frequency [Hz]	Amplitude [mm]	Acceleration [m/s²]
	2 ≤ f < 9	0.3	not applicable
	9 ≤ f < 200	not applicable	1

■ Approvals

CE-labeling

The HCJ servo drives meet the requirements of the low-voltage directive 2006/95/EG and the product regulation EN 61800-5-1. Hence the servo drives are meeting the requirements for installation in a machine or system according to the machine regulation 2006/42/EG. The servo drives are CE labeled accordingly. The CE label on the type plate signifies the conformity to the prementioned regulations.

UL / UR approval

The HCJ servo drives have the following approvals:

Servo drives	Approval
22.003.xxxx.xxxx.x	UR
22.006.xxxx.xxxx.x	UL
22.008.xxxx.xxxx.x	UL
24.002.xxxx.xxxx.x	UR
24.004.xxxx.xxxx.x	UL
24.007.xxxx.xxxx.x	UL
24.012.xxxx.xxxx.x	UL
24.016.xxxx.xxxx.x	UL

EMV approval

Due to their structure all HCJ servo drives feature an interference immunity according to EN 61800-3 environment class 1 and 2. In order to keep the grid-bound emitted interference limited to the permissible level, external EMC mains filters are provided (see chapter "accessories"). By usage of these mains filters the EMV directive 2004/108/EG is respected:

- Public low-voltage network: "First environment" (living area C2) up to 10 m motor cable length
- Industrial low-voltage network: "Second environment" (industrial area C3) up to 30 m motor cable length

STO approval

The safety function "STO" (Safe Torque Off) integrated in the HCJ servo drive is certified according to the following requirements:

- EN 61800-5-2
- EN ISO 13849-1 "PL e"
- EN 61508 / EN 62061 "SIL3".The approval was conducted by the accredited certification agency "TÜV Rheinland".

HCJ servo drive

Size 2



Specifications

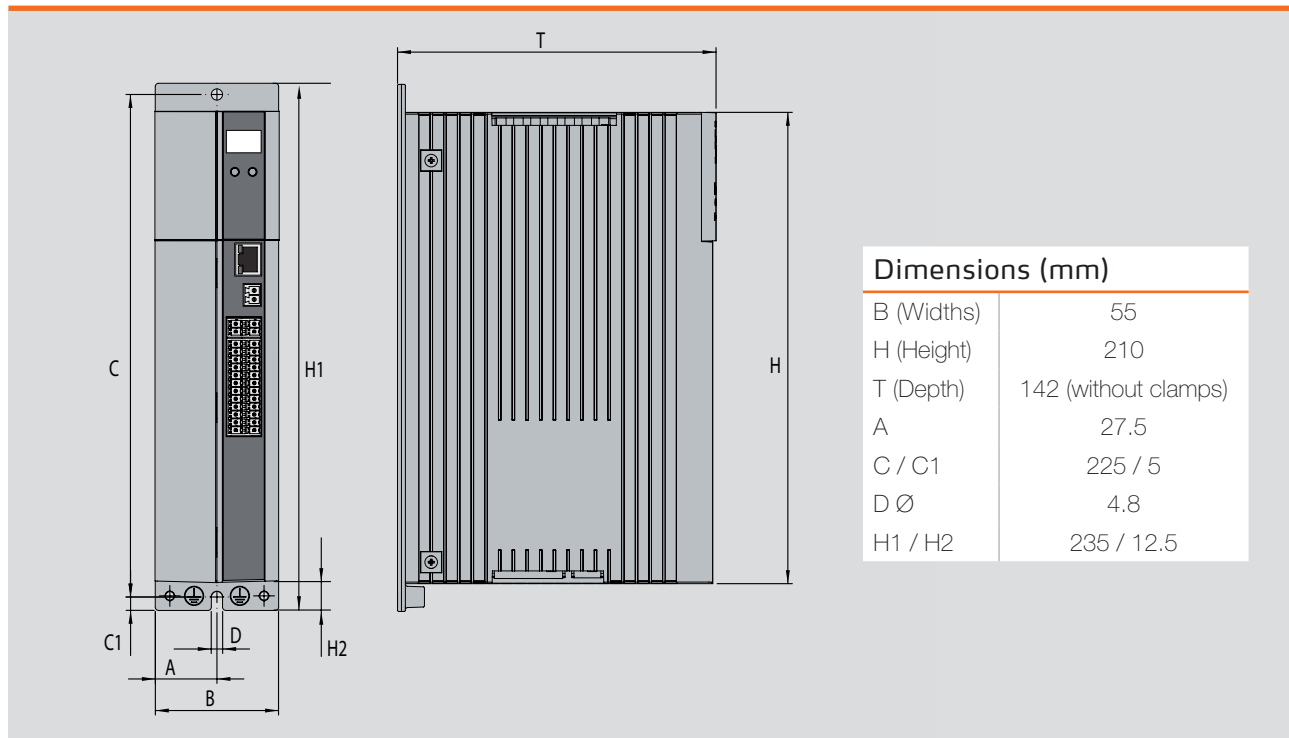
	HCJ22.003	HCJ24.002
Output motor side		
Voltage	3 x 0 - 230 V	3 x 0 - 400 V 3 x 0 - 460 V
Rated current I_N ¹⁾	3 A _{rms}	2 A _{rms} ²⁾
Overload capability	p. 29	p. 29
Rotating field frequency	0 ... 400 Hz	
Power amplifier switching frequency	4, 8, 16 kHz	
Input mains side		
Supply voltage	(1 x 230 V _{AC}) - 20 % / + 15 %	(3 x 400 V _{AC} / 3 x 460 V _{AC}) ± 10 %
Device connected load (with power choke)	1.3 kVA	1.5 kVA
Current (with power choke)	5.4 A	2.2 A ²⁾
Frequency	50 / 60 Hz ± 10 %	
Dissipation loss at 8 kHz and I_N	75 W	42 W ²⁾
Intermediate circuit		
Capacity	880 μF	220 μF
Brake chopper switch-on threshold	390 V _{DC}	650 V _{DC} ²⁾
Minimal ohmic resistance of an externally installed brake resistor	72 Ω	230 Ω
Brake chopper permanent power with external brake resistor ³⁾	2.1 kW	1.8 kW
Brake chopper peak power with external brake resistor ³⁾	2.1 kW	1.8 kW
Internal brake resistor	550 Ω (PTC)	7,500 Ω (PTC)
Brake chopper permanent power with internal brake resistor ³⁾	0 W	0 W
Brake chopper peak power with internal brake resistor ³⁾	400 W	200 W ²⁾

1) Value refers to 4 kHz and 8 kHz switching frequency.

2) Value refers to 400 V_{AC} mains voltage.

3) Brake resistor is always integrated, connection of an external resistor is permissible.

Dimensional drawing



Mechanics

HCJ22.003 / HCJ24.002

Cooling concept	Wall mounting
Protection class	IP20 except clamps (IP00)
Cooling air temperature	max. 45 °C (at 4 kHz power amplifier switching frequency)
Weight	1.0 kg
Mounting method	vertical mounting with free air flow
Mounting of several servo drives	directly stackable

Suitable accessories

HCJ22.003

HCJ24.002

Mains choke	LR 32.14-UR (1 x 230 V)	LR 34.4-UR
Brake resistor (ext.)	BR-090.01.540-UR (35 W) BR-090.02.540-UR (150 W) BR-090.03.540-UR (300 W)	BR-260.01.540-UR (35 W) BR-260.02.540-UR (150 W)
Mains filter	EMC8.2-1Ph, UR (1 x 230 V)	EMC5.2-3Ph, UR

HCJ servo drive

Size 3



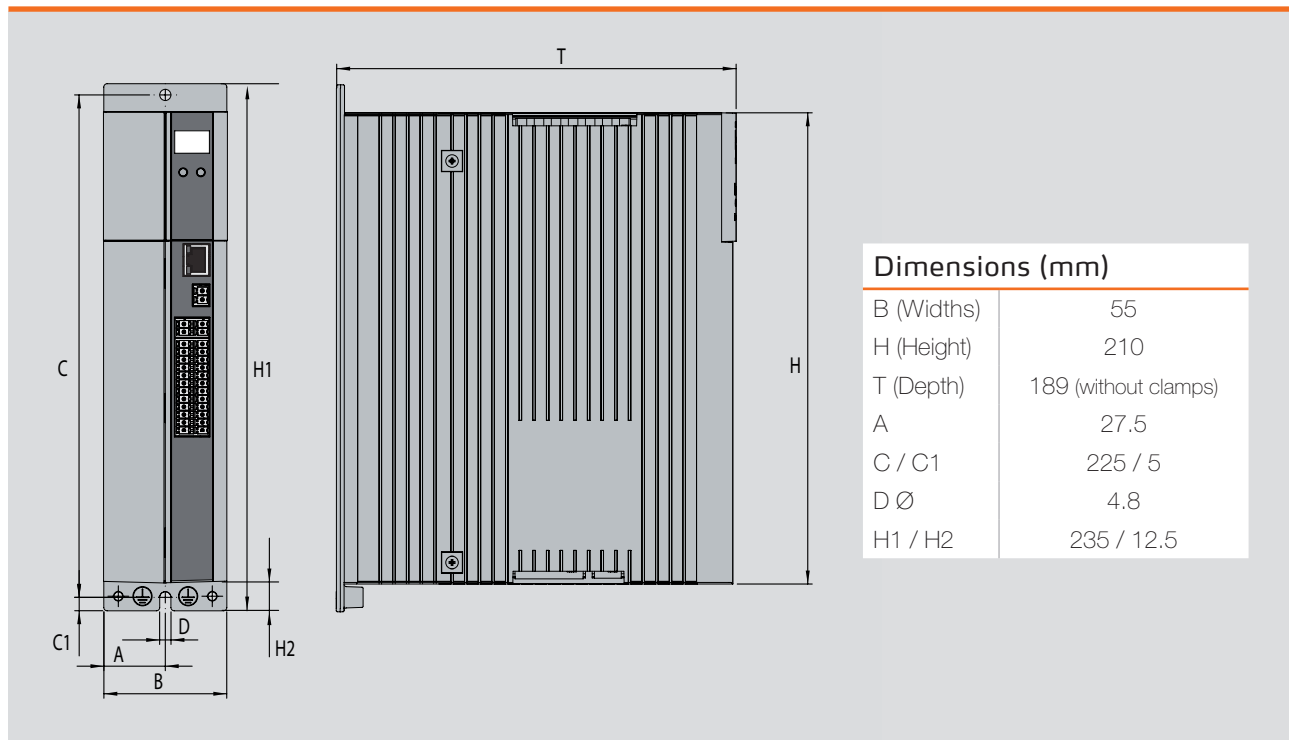
Specifications

	HCJ22.006	HCJ24.004
Output motor size		
Voltage	3 x 0 - 230 V	3 x 0 - 400 V 3 x 0 - 460 V
Rated output current I_N ¹⁾	5.9 A _{rms}	3.5 A _{rms} ²⁾
Overload capability	p. 29	p. 29
Rotating field frequency	0 ... 400 Hz	
Power amplifier switching frequency	4, 8, 16 kHz	
Input mains side		
Mains voltage	(1 x 230 V _{AC}) - 20 % / + 15 %	(3 x 400 V _{AC} / 3 x 460 V _{AC}) ± 10 %
Device connected load (with power choke)	2.6 kVA	2.7 kVA
Current (with power choke)	10.6 A	3.9 A ²⁾
Frequency	50 / 60 Hz ± 10 %	
Dissipation loss at 8 kHz and I_N	150 W	80 W ²⁾
Intermediate circuit		
Capacity	1,320 µF	330 µF
Brake chopper switching shaft	390 V _{DC}	650 V _{DC} ²⁾
Minimal ohmic resistance of an externally installed brake resistor	72 Ω	180 Ω
Brake chopper permanent power with external brake resistor	2.1 kW	2.3 kW
Brake chopper peak power with external brake resistor	2.1 kW	2.3 kW
Optionally: internal brake chopper	100 Ω	420 Ω
Brake chopper permanent power with internal brake resistor	Depending on the effective workload of the controller within the respective application	
Brake chopper peak power with internal brake resistor	1,500 W	1,000 W ²⁾

1) Value refers to 4 kHz and 8 kHz switching frequency

2) Value refers to 400 V_{AC} mains voltage

Dimensional drawing



Mechanics

HCJ22.006 / HCJ24.004

Cooling concept	Wall mounting
Protection class	IP20 except clamps (IP00)
Cooling air temperature	max. 45 °C (at 4 kHz power amplifier switching frequency)
Weight	1.5 kg
Mounting method	vertical mounting with free air flow
Stack mounting of more servo drives	directly stackable

Suitable accessories

HCJ22.006

HCJ24.004

Mains choke	LR 32.14-UR (1 x 230 V)	LR 34.6-UR
Brake resistor (ext.)	BR-090.01.540-UR (35 W) BR-090.02.540-UR (150 W) BR-090.03.540-UR (300 W) BR-090.10.650-UR (1,000 W)	BR-200.01.540-UR (35 W) BR-200.02.540-UR (150 W) BR-200.03.540-UR (300 W)
Mains filter	EMC14.2-1Ph, UR (1 x 230 V)	EMC5.2-3Ph, UR

HCJ servo drive

Size 4



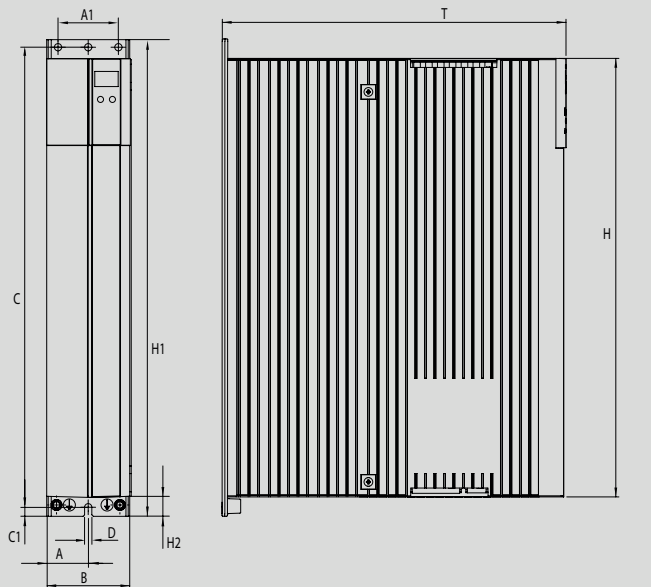
Specifications

	HCJ22.008	HCJ24.007
Output motor side		
Voltage	3 x 0 - 230 V	3 x 0 - 400 V 3 x 0 - 460 V
Rated output current I_N ¹⁾	8 A _{rms}	6.5 A _{rms} ²⁾
Overload capability	p. 29	p. 29
Rotating field frequency	0 ... 400 Hz	
Power amplifier switching frequency	4, 8, 16 kHz	
Input mains side		
Mains voltage	(1 x 230 V _{AC}) - 20 % / + 15 %	(3 x 400 V _{AC} / 3 x 460 V _{AC}) ± 10 %
Device connected load (with power choke)	3.5 kVA	5.0 kVA
Current (with power choke)	14.4 A	7.2 A ²⁾
Frequency	50 / 60 Hz ± 10 %	
Dissipation loss at 8 kHz and I_N	200 W	150 W ²⁾
Intermediate circuit		
Capacity	1,760 µF	440 µF
Brake chopper switching shaft	390 V _{DC}	650 V _{DC} ²⁾
Minimal ohmic resistance of an externally installed brake resistor	72 Ω	72 Ω
Brake chopper peak power with external brake resistor	2.1 kW	5.9 kW
Optionally: internal brake chopper	90 Ω	90 Ω
Brake chopper permanent power with internal brake resistor	Depending on the effective workload of the controller within the respective application	
Brake chopper peak power with internal brake resistor	1.7 kW	4.7 kW ²⁾

1) Value refers to 4 kHz and 8 kHz switching frequency

2) Value refers to 400 V_{AC} mains voltage

Dimensional drawings



Dimensions (mm)

B (Widths)	55
H (Height)	290
T (Depth)	235.5 (without clamps)
A	27.5 / 40
C / C1	305 / 5
D Ø	4.8
H1 / H2	315 / 12.5

Mechanics

HCJ22.008 / HCJ24.007

Cooling concept	Wall mounting
Protection class	IP20 except clamps (IP00)
Cooling air temperature	max. 45 °C (at 4 kHz power amplifier switching frequency)
Weight	2.8 kg
Mounting method	vertical mounting with free air flow
Stack mounting of more servo drives	directly stackable

Suitable accessories

HCJ22.008

HCJ24.007

Mains choke	LR 34.8-UR	LR 34.8-UR
Brake resistor (ext.)		BR-090.01.540-UR (35 W) BR-090.02.540-UR (150 W) BR-090.03.540-UR (300 W) BR-090.10.650-UR (1,000 W)
Mains filter	EMC11.2-3Ph, UR	EMC11.2-3Ph, UR

HCJ servo drive

Size 5



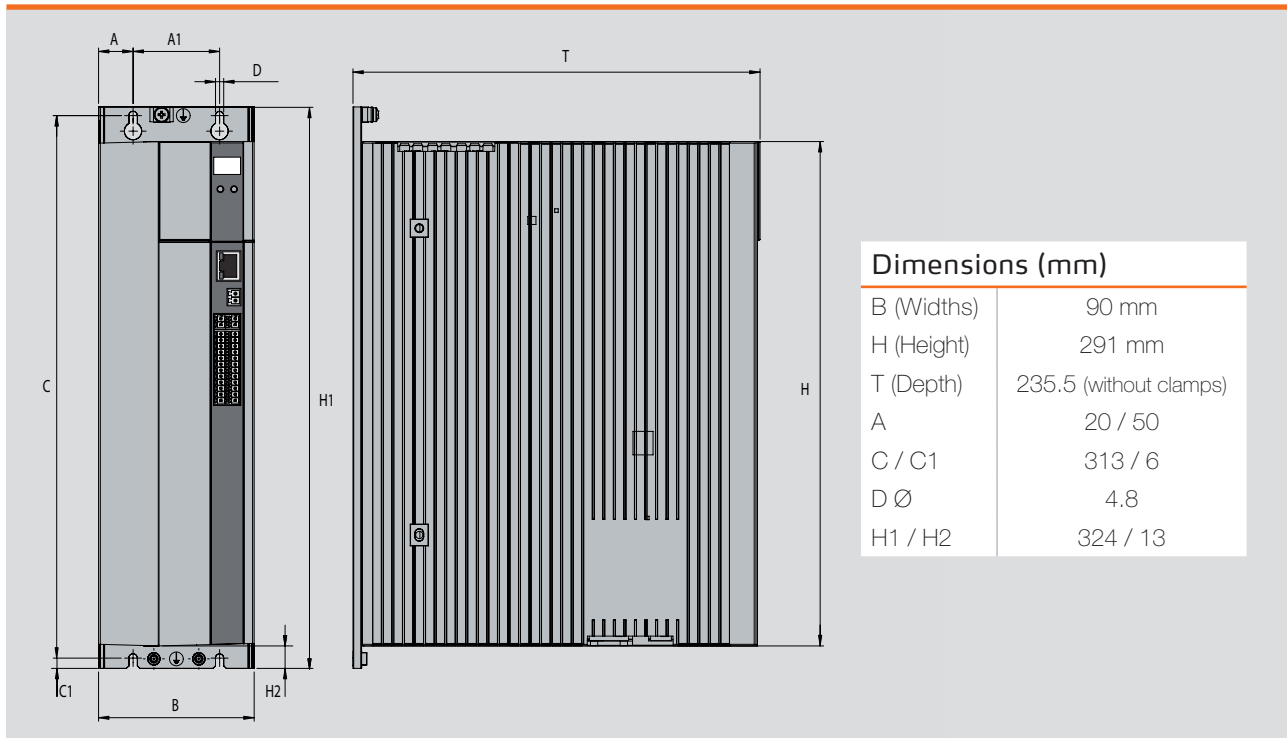
Specifications

	HCJ24.012	HCJ24.016
Output motor side		
Voltage	3 x 0 - 230 V	3 x 0 - 400 V 3 x 0 - 460 V
Rated current I_N ¹⁾	12 A _{rms}	16 A _{rms}
Overload output capability	p. 29	p. 29
Rotating field frequency	0 ... 400 Hz	
Power amplifier switching frequency	4, 8, 16 kHz	
Input mains side		
Mains voltage	(3 x 400 V _{AC} / 3 x 460 V _{AC}) ± 10 %	
Device connected load (with power choke)	9.1 kVA	12.2 kVA
Current (with power choke)	13.2 A	17.6 A
Unbalance of mains voltage	± 3 % max.	± 3 % max.
Frequency	50 / 60 Hz ± 10 %	
Dissipation loss at 8 kHz and I_N	263 W ^{1) 2)}	316 W ^{1) 2)}
Intermediate circuit		
Capacity	680 μF	1,120 μF
Brake chopper switching shaft	650 V _{DC} ²⁾	650 V _{DC} ²⁾
Minimal ohmic resistance of an externally installed brake resistor	35 Ω	25 Ω
Brake chopper permanent power with external brake resistor	12 kW ²⁾	16.9 kW ²⁾
Brake chopper peak power with external brake resistor	12.1 kW ²⁾	16.9 kW ²⁾
Optionally: internal brake chopper	90 Ω	90 Ω
Brake chopper permanent power with internal brake resistor	Depending on the effective workload of the controller within the respective application	
Brake chopper peak power with internal brake resistor	4.7 kW ²⁾	4.7 kW ²⁾

1) Value refers to 4 kHz and 8 kHz switching frequency

2) Value refers to 400 V_{AC} mains voltage

Dimensional drawings



Mechanics

HCJ24.012 / HCJ24.016

Cooling concept	Wall mounting
Protection class	IP20 except clamps (IP00)
Cooling air temperature	max. 45 °C (at 4 kHz power amplifier switching frequency)
Weight	5.5 kg / 5.9 kg
Mounting method	vertical mounting with free air flow
Stack mounting of more servo drives	directly stackable

Suitable accessories

HCJ24.012

HCJ24.016

Mains choke	LR 34.14-UR	LR 34.17-UR
Brake resistor (ext.)	BR-090.01.540-UR (35 W) BR-090.02.540-UR (150 W) BR-090.03.540-UR (300 W) BR-090.10.650-UR (1,000 W)	
Mains filter	EMC16.2-3Ph, UR	EMC25.2-3Ph, UR

Technical data subject to change! Last changes 11/2023

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